THE OPTICAL

MAGIC LANTERN

JOURNAL

AND

PHOTOGRAPHIC ENLARGER.

EDITED BY J. HAY TAYLOR.

Vol. 6.—No. 77. [Entered at Stationers' Hall] OCT., 1895. Double No., Price 2d.

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THE *Optical Magic Lantern Journal and Photographic Enlarger* is issued on the 1st of every month, price One Penny, and may be obtained from all Newsvendors, Railway News Stalls, Photographic Dealers, or from the Publishers, at the following rates, post free:—

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EDITORIAL communications must be addressed, J. HAY TAYLOR. Advertisements and business communications to **Taylor Brothers, 56, Chancery Lane, London, W.C.**

American Agents:—The International News Co., 83 and 85, Duane Street, New York City.

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	Each.	Postage.
Binding Cases for 12 numbers	**1/-**	**1½d.**
Reading Cases with 12 cords at back	**1/3**	**1½d.**
Bound Vols. for 1894	**3/-**	**1½d.**

Notes.

THE lantern was first used for electioneering by Mr. James Lloyd of Ashbury, whose death has just taken place. At the time, he was subjected to a good deal of ridicule for having adopted the lantern as a political agent, though time has now shown that he was only a little in advance of others with the idea of imparting certain information to the public in the most effective manner.

* * *

THE Salvation army are making active arrangements for the use of the lantern in connection with their services. In such places as they have it in operation, it has been hailed with delight, so much so that we are given to understand that in a short space of time every salvation army barracks will be supplied with a lantern outfit, and that in popularity the Big Drum will have a serious rival.

* * *

As a preventative to cutting prices for slides by wholesale firms, Messrs. York & Son have obtained a written guarantee from all their wholesale customers that a stated price will be adhered to, and all new applicants for wholesale terms will be required to give a similar guarantee before their business with this firm will be entertained.

* * *

ON the 9th of last month, the Theatre Royal at West Bromwich was destroyed by fire. During the progress of the fire an alarming explosion occurred, caused, it is said, by the heat acting on a cylinder of compressed gas which ultimately exploded.

At a meeting of the Liverpool Amateur Photographic Association, the following resolution was proposed and seconded "That a Memorial Fund be started by the Association to be called 'The Sayce Memorial Fund,' and that the proceeds thereof be handed to Mr. Sayce's widow, and that Mr. John Hargreaves be, and is hereby appointed Hon. Treasurer of the Fund." The Council of the Association take the opportunity of saying that they feel that the Association, and the photographic world in general, are greatly indebted to the man who has probably done more than any other to render photography practicable and simple by his early discoveries in the dry-plate processes, which have been the main basis of all modern photography. They recognise the fact that, although the researches and experiments cost him much time and money, Mr. B. J. Sayce has for over thirty years given the benefit of his discoveries free to all the world. Subscriptions to be sent to Mr. J. Hargreaves, Hon. Sec., Percy Buildings, Eberle Street, Liverpool.

* * *

Mr. E. C. C. Baly, of University College, has presented to the Royal Society a preliminary note tending to establish the fact that oxygen is not a simple body, as has hitherto been thought, but an association of two distinct gases. He says: If oxygen be submitted to a silent electric discharge, the gas that goes to the cathode, according to the experiment, while remaining oxygen, exhibits a density sensibly different from that of non-electrified oxygen. In the case of long sparks the density is less. The opposite is the case when short sparks are made to act.

* * *

The fifth annual exhibition of the East London Photographic Society will be held at the New Tabernacle, Old Street, E.C., on the 28th and 29th inst. Entry forms and all particulars may be obtained from Mr. F. Uffindell, Hon. Exhibition Secretary, 29, Scrutton Street, Finsbury, E.C.

* * *

A new lantern objective, termed the Cooke lens, will shortly be placed on the market by the well-known firm of lens makers at Leicester.

* * *

During the last few days, Messrs. Airs & Co., the makers of the "Bessus" lanterns and apparatus, have removed from 152, Farringdon Road, to new premises at 84, Hatton Garden, E.C.

* * *

A large selection of lantern apparatus will be sold by auction at 57, Farringdon Road, E.C., on October 1st, by Messrs. Theobald & Co.

Before leaving England, the Shahzada got his interpreter to translate the advertisements in the Optical Magic Lantern Journal for him, as he wished to purchase a lantern. Our readers may be interested in learning that a special lantern was built for him, at short notice, by Mr. J. H. Steward, 406, Strand, and that during its trial it was pronounced perfect.

* * *

The Annual Exhibition of the Royal Photographic Society opened at 5a, Pall Mall, on September 28th, with a Soirée, which was a brilliant success. The exhibition will remain open till November 14th.

—:o:—

How Gas Cylinders are conveyed at Guernsey.

A great deal of discontent has lately been manifested in Great Britain in connection with the new stringent railway laws respecting the conveyance of cylinders of compressed gas, but compared to the difficulties that one has to go through in order to give a lantern exhibition in Guernsey, they are a mere nothing.

Certain of our leading exhibitors find the Channel Isles a good place wherein to give a series of exhibitions each year, and in getting ready for this season, they, having ascertained that the steamboats running in connection with the railways will not under any conditions carry gas cylinders, have decided that the only way to get cylinders across is to send them well in advance by sailing vessels. So far there is no difficulty in getting them there by this means, but it is after they are there that the difficulties begin.

It appears that cylinders, when landed, come under the Local Explosives Act, and this requires that when explosives are carried along the street, an official with a large red flag must precede such parcels or packages at a certain number of paces; so that when a cylinder has been landed, it must be thus escorted to the hall where the entertainment is to be given. This arrangement will hardly inspire confidence among the inhabitants, and cannot be said to be calculated to ensure large audiences, but perhaps amends may be made, seeing that a procession must thus be formed, and the public in general warned to keep clear, by the entertainer joining in line also, he and his assistants waving flags of another colour containing such devices as will tend to allay all fears. However, we will soon see how the new arrangement works in practice.

The London County Council and Lanternists.

By C. Goodwin Norton.

Last season it was necessary to caution the lanternist who travels by rail, of the regulations to be observed with regard to gas cylinders, in order to avoid inconvenience and delay. The regulations then made by the railway companies are still in force, with the addition that compressed gases will not be conveyed as passenger's luggage, but only as parcels, and when paid for accordingly. This naturally necessitates the operator being at the station at least thirty minutes previous to the departure of the train. It is scarcely necessary to remark that if the quantity of gas exceeds 20 feet it is better to send it three days before by goods train. A 20 feet vessel, full, will thus travel 200 miles for 1s. 3d., and empty for 8d.

This season fresh pitfalls await the lanternist who exhibits in London. The London County Council, in consequence of what they believe to have been gross carelessness on the part of an operator in a London suburb, have discovered that gas cylinders are *dangerous*, and have made the following requirements :—

I.—That no gas bags shall be allowed in or near any building over which they have control.

II.—That when cylinders are used inside a building they must be quite away from the audience and placed in a fire-proof chamber closed with iron doors, the chamber to be ventilated.

III.—Each cylinder to be in a separate chamber or they may be placed outside the hall under lock and key. That iron tubing or a special kind of rubber tubing which cannot be compressed be used to convey gas.

IV.—That an automatic regulator be used on the cylinder, a stopcock placed just behind the jets in addition to the ordinary taps, and that the tubing be screwed or otherwise securely fastened to both cylinder and jet.

V.—That no ether saturator or mixed jet be used.

These requirements were first made especially for use in connection with theatres where the limelight is used for scenic effect, but in future they are to include magic lantern entertainments and lectures; and, if rigidly enforced, will put a stop to them altogether, for what exhibitor would care to use a blow-through jet at, say, the People's Palace or the Victoria Hall?

The lanternist need not be greatly alarmed as far as he personally is concerned, for there is no penalty attached to him for a breach of these rules. All that the London County Council can do is to re-consider the question of the granting of the licence for the hall at the next renewal.

A more pertinent question would be: Do these regulations conduce to safety, *e.g.*, take the one of putting the cylinder in a fire-proof chamber, will this prevent an explosion, or would it not make any possible explosion many times worse? A pound of gunpowder, if spread out, can be safely ignited with a lucifer match, but put it into a fire-proof chamber, ignite it, and see what will happen. Again, supposing the cylinder is outside the hall and the regulator goes wrong (which happens more often than a cylinder explodes), what is the operator to do? Either the light goes out suddenly or there is a great hissing, and if the operator turns off the gas at the jet, the tube will probably be blown off, whereas if the cylinder is close to the lantern, the gas can be turned off at once and no harm done.

It is admitted by everyone that the safety of the public is of the highest importance and that the London County Council is the proper authority to look after it, but until lantern exhibitions are declared unsafe by competent persons, surely it is not too much to ask, that the harassing restrictions referred to should only be made where absolutely necessary.

The London County Council have left out of consideration altogether the chief peculiar dangers to which lantern audiences are subjected, thus, not a word is said about an oil lantern being placed in an unsafe position, nor is any regulation made to prevent the possibility of its being turned over and setting the place on fire; neither is there anything to prevent the operator from filling an ether saturator in a crowded hall.

It is suggested that the following would be ample to secure the public from danger as far as the exhibition of a magic lantern is concerned :—

I.—That the lantern be not placed in the centre gangway, but on one side within a clear space of not less than 8 feet each way. This space to be securely fenced round by ropes or strips of wood fastened to the seats or chairs.

II.—That not more than two persons be allowed within this space.

III.—That five minutes before the public are admitted, the operator to take his place beside the lantern and not to leave until the public have all gone.

IV.—That the screen and lantern be got ready before the public are admitted, so that the operator has only to turn on the gas and light up just before the time for commencing, all adjustments of the light and distance having been previously completed.

V.—The gas vessels to be placed close to the lantern, either laid on the floor or securely tied or otherwise fastened to some permanent portion of the building.

VI.—The connecting tubes to be flexible metal and as short as possible, so arranged that they can neither be trodden on nor be in the way of the operator.

VII.—The supply tubes to be securely fastened to the cylinders, but not tied or screwed at the lantern end.

VIII.—Automatic regulators to be used on gas cylinders, and stopcocks (not to be of a screw-down pattern) to be placed in the supply tubes just behind the lantern in addition to those on the jets.

IX.—In all cases the structure on which the lantern is placed, to be of a substantial nature and fastened to the floor, or other means taken to prevent it or the lantern from falling over.

X.—No ether saturator, oil lamp, or spirit jet to be charged within the building or after dark.

XI.—Only "Safety" matches or an electric lighter to be used by the operator, and no lighted lamp or illuminant to be used within the enclosure unless it is protected by gauze.

XII.—All gas cylinders must fulfil the conditions required by the railway companies.

XIII.—The gas supply of the hall be so arranged that the lights can be instantly turned up without danger of their being turned out, and that the person whose duty it is to attend to the gas remain near the tap and perform no other duty during the whole time of the lecture or entertainment.

The experienced lanternist will doubtless take other precautions, having reference to any special method of working or course of experiments to be conducted, as any procedure which gives the public confidence is of benefit to the whole body of lanternists.

——:o:——

The Phantasmagoria.

By Edmund H. Wilkie,
Late Royal Polytechnic Institution.

Of all known methods of producing projected pictorial effects, the exhibition generally called the Phantasmagoria is the most perfect, as it admits of the use of an unlimited number of lanterns, and the greatest possible variety of motions. For various reasons we rarely see an entertainment of this character now, and I think I am justified in saying that to the younger members of the dissolving view fraternity at least, most of the effects which created so much interest in the past are practically unknown. We have no real headquarters at the present day where all the appliances for producing these wonderful effects can be found in daily use, and for their perfect exhibition, not only a considerable amount of space both before and behind the screen is required, but a staff of trained assistants and a large quantity of specially constructed apparatus.

From this it will be seen that the real phantasmagoria is not the kind of entertainment suited to the needs of the travelling lecturer, but rather to form a portion of a permanent exhibition, or to provide certain effects in dramatic performances.

We must in the first place consider what the phantasmagoria is. It is difficult to define, as so many different exhibitions have been given under that title; but speaking generally, it consists of lantern effects of a mechanical nature, during the exhibition of which the lantern is moved to different positions, with regard to the screen, in order to produce the appearance of advance and retrograde motions in the projected image. Thus it embraces many effects which it would be impossible to realise under the usual conditions.

It is the oldest form of lantern entertainment which caused any considerable interest, and from the time of its introduction the magic lantern has occupied a much higher position in the ranks of scientific instruments.

Previous to the phantasmagoria, lantern pictures were complete luminous circles, and in the case of figures the backgrounds consisted frequently of plain glass alone, the process of "blacking-out" not being then in use.

In many books treating upon optics and lantern work generally, mention is made of the illusions witnessed by Benvenuto Cellini (of which full particulars may be found in Mr. Roscoe's "Life of Cellini") in the company of a Sicillian priest, in the course of which spectres appeared hovering in the smoke rising from a brazier, and although Cellini would appear to have had some knowledge of the means of producing these apparitions, yet he seemed to have been considerably frightened as the demons danced before him. I mention this circumstance as it is frequently suggested that these ghostly figures were produced by pictures from a magic lantern, which were blacked-out in the same manner as those used in the phantasmagoria and received upon clouds of smoke which acted as a screen, but it must be pointed out that the effects described by Cellini were witnessed by him just about 100 years before the invention of the magic lantern by Kircher in the seventeenth century.

I have dwelt upon this point as I have been unable to find any convincing or definite evidence of blacked-out figures having been exhibited before 1802, in which year the German, Phillipstall, produced his phantasmagoria in London.

It would seem at first sight to be a matter of small importance, but we must bear in mind that the blacked-out figure was the foundation of those beautiful effect slides, which form the very backbone of dioramic exhibitions.

Phillipstall's phantasmagoria deserves some little attention, as the manner in which it was carried out was impressive and at the time novel. From the descriptions given in contemporaneous prints, and in the works of Sir David Brewster, we learn that the hall of exhibition was lighted by an oil lamp hanging from the ceiling, giving a very small amount of light, and which could be entirely shut out by pulling the lamp upwards into a dark shield. Before darkening the room a curtain rose and disclosed a cave scene tastefully decorated with skeletons and other objects of a gruesome character. Thunder was then heard, and the lamp being drawn up, left the audience in total darkness, a thin transparent screen was lowered between the stage and the spectators, and flashes of lightning thrown upon it from the back by means of the lantern. After this, black velvet curtains closed in from the sides, leaving only the centre of the screen exposed, and on this, various terrifying figures were projected from a lantern mounted on wheels to allow of its moving to or from the screen.

As the lantern approached the screen, the figures appeared to recede as they contracted in size, and as the lantern moved backwards they expanded in a corresponding degree, giving the appearance of rushing forward towards the spectators. This portion of the performance caused much excitement amongst the audience, many of the more impressionable persons feeling quite convinced that the figures really did rush forward, and declaring that they could have touched them. The effect was further heightened by wax masks being suspended in various parts of the room, having lamps behind them with revolving shields like the modern dark lantern.

The shields being made to rotate by mechanical means, illuminated the masks at intervals, causing them to appear and disappear. Many of the figures used by Phillipstall were painted by the late Mr. H. L. Childe. This latter gentleman, who may be termed the father of mechanical lantern effects, afterwards painted a long series of moving pictures and original effects, which he produced at various places in England and Scotland with great success, and many of the effect slides invented by him may be found in the catalogues of the best opticians at the present time. He also gave entertainments in private houses and at garden parties, and I have before me now one of the original effects used by him in his travelling exhibition. It is well-known, and is entitled "Hearts of Oak," consisting of two pictures, the first one showing the old wooden warship *Victory* at sea, firing a gun, which dissolves into an oak tree with sailors in the branches, and the figure of Britannia seated on a lion at the base of the trunk.

The finest exhibition of the phantasmagoria ever put before the public is generally considered to be that produced under Mr. Childe's direction at the late Royal Polytechnic Institution in 1849, when Mr. Childe's own apparatus, consisting of two large lanterns with nine-inch condensers, and two small lanterns with six-inch condensers, was used behind the screen, and the Polytechnic battery of four large lanterns, with nine-inch condensers, in the ordinary manner from the front.

The exhibition gave great satisfaction, and preparations were made to revive it with improvements in 1859, but in that year an unfortunate accident occurred. A portion of the staircase fell, injuring many of the visitors, whose claims for compensation were so heavy that the whole affair was thrown into Chancery, and the arrangements in the case of the phantasmagoria fell through. Having in this paper briefly reviewed the history of the phantasmagoria, I shall endeavour in my next to describe in detail the apparatus used, and give some account of individual effects.

(*To be continued*).

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How to Purchase a Lantern.

By the Showman.

Continued from page 144.

For ordinary purposes the best attachment of the lens to the stage is by means of a single tube, in the outer end of which slides and fits nicely another tube carrying a brass ogee, into which the rack mount of the lens is screwed, the outside tube being of a length suited to the focus of the objective. To focus the picture, rack the lens about half-way out, then draw out the sliding tube slightly until a fair image is obtained, and lastly, give a finishing touch with the rack. The lens mount should be fitted with a flashing shutter, so that the lens may be kept closed until the exhibition begins, and the picture instantly shut off should any slight hitch occur until the same is rectified.

Now for a word as to the form, quality, and diameter of an objective. The form now almost universal is a double combination of the portrait class, which is specially made for projection, and is not corrected for photography. This class of lens works at full aperture, and gives very excellent results. As to quality, the inexperienced may well be bewildered at the tremendous range in prices, finding as he does lenses from ten shillings a-piece to nearly twenty pounds; but he may rest assured that no optician or dealer of repute will ever sell him a really bad lens; in fact many of the cheaper lenses, by which is meant those up to £2, are really excellent. I do not think that any hard and fast rule can be laid down as to the relation between the price and quality, but it would seem that the price varied at least as the square of the ratio of the quality; that is to say, a lens of a certain quality costs £2; a lens twice as good in every respect would probably cost, not £4, but at least £8, so the question of the cost of the objective may best be left to the pocket of the individual purchaser. It is often recommended that lenses of longer focus than eight inches should be of large diameter. These are more expensive, but certainly pass more light, though many good exhibitions are given with those of smaller diameter.

The lens between the radiant and the slide, known as the condenser, consists usually of two lenses, which for short focus objectives are each of plano-convex form, with their convex faces placed together and nearly in contact. For objectives of long foci, a meniscus condenser can be substituted for the plano-convex lens next the light, and these two combinations are not expensive, and give very good results through a long range of foci. Condensers consisting of three lenses are obtainable, and some with four and even five lenses have been made; but although the aberrations are more perfectly corrected in these, a certain loss of light is entailed by the extra reflecting surfaces, and as the cost is considerably increased, such condensers are not in general demand. In the case of enlarging lanterns with condensers of considerable diameter, perhaps ten inches, the case is different, as these condensers being of comparatively long focus, the interposition of a third lens of smaller diameter near the radiant enables the main system to take up a much larger angle of light than it would otherwise. The present writer's opinion is that, with the ordinary double condensers as good as they are, nothing better is necessary to the requirements of the average lanternist, and that, although a condenser which is good up to a certain point is of paramount importance, yet, if an extra sovereign or so is to be spent upon the optical system of a lantern, it is far better to invest it in a superior objective.

A bayonet catch should be fitted to the condenser cell; this consists of a short pin fixed on the outside of the condenser mount, for which a slot is cut in the ring into which the condenser fits. This slot runs first of all for a short distance in the direction of the optical axis, then a little way at right angles to its former direction. An amateur with a few tools, and the knowledge of how to use them, can fit a bayonet catch if it is not already provided. It is sometimes stated that a hole should be provided in the condenser mount to let out the steam, but it must not be forgotten that this hole will also let damp and dust in; at any rate it can well be dispensed with, but if existing, should of course correspond with a hole in the outside ring. The diameter of a condenser is another point which has to be considered, and is mainly regulated by the size of the slide to be exhibited, though not entirely so. If the slides to be used are known, they can be referred to in this connection, but if not, and slides have to be taken as they come, a great many different shapes and sizes will be met with, among which the cushion shape will probably predominate. The measurement of a cushion shaped slide, diagonally from corner to corner, will vary somewhat, but will probably not exceed 3¾ inches, and as no other shape will measure more, this may be taken as the size the condenser has to illuminate. Many writers tell us that a 4 inch condenser will illuminate this size; which is true, if the slide be placed close to it. It never is, however, in practice, for if supported in a frame the slide is at least ¼ inch away, while with any sort of carrier the distance is still greater. The recess for the curtain shutter in bi-unials and triples takes up some more room, so that a slide is not unfrequently ¾ inch away from the condenser. Now in a lantern condenser the rays are coned down to fall into the area of the objective, so that the effective diameter of a condenser decreases the further away we place the slide from it. Again, in a short focus instrument the rays are coned down more abruptly than in one of larger focus; so in this way the objective bears a certain relation to the diameter of the condenser, for if we place a slide at a certain distance from a condenser working with a short focus objective, we may find the corners cut off, though they are fully illuminated in another case with a long focus objective, the diameter of the condenser and the position of the slide remaining constant. So that it is often better to decide upon a 4¼ inch or 4½ inch condenser than a 4 inch one.

The case for the lantern should be of wood and capable of taking the lantern with jets and most fittings in position. An end door is objectionable, for as the case racks in, being moved, the door pushes the top and bottom and sides apart, and if the case is turned door end down, the whole weight of the lantern comes upon the hinges and lock of the door. The case should be made so that one side takes completely off, and is fixed in place with four nuts.

As to the general form of the lantern, a word may not be out of place.

The novice will do well to avoid those lanterns which show a considerable departure from the normal, bearing in mind that the stereotyped patterns have borne the test of time, and that it is too often the case that peculiar types embody some advantage, only at the cost of introducing some counterbalancing disadvantage. At any rate he had best assure himself that the large lantern does not mean excessive weight, or the small lantern excessive heat; that the folding lantern does not gain portability at the expense of time spent in setting up and taking down, or the bellows fronted variety portability at the expense of rigidity and accurate centering of the optical system.

In conclusion, it may be said that it has been the aim of the writer not to lay down any hard and fast rules, but to set before the reader many of the *pros* and *cons* of the subject, so that he may be able to decide the more momentous points for himself according to pocket and inclination, and be in a position to go forth and interview his nearest dealer with a clear conception of his real requirements, when about to purchase a lantern.

—:o:—

The Lantern in Science Teaching.

By E. Drew.

Winter is again drawing near, and it is to be hoped that the usefulness of the lantern will be more thoroughly appreciated in aiding the advancement of learning. There are undoubtedly many who anticipate using the lantern for the furtherance of education in some direction. In this article it is the endeavour of the writer to state briefly the various ways in which the lantern and its accessories can be used.

There are five methods that can be adopted in optical projection, and by means of which a large number of illustrated experiments can be shown.

The first is the ordinary method, as when a photographic lantern slide is used and projected by condenser and objective.

The second method is by throwing a shadow by taking away the objective, and in some cases by using the electric arc light and removing the condenser.

Thirdly, the use of a vertical attachment, whereby objects that cannot be placed vertically can be thrown upon a horizontal platform upon the screen.

Fourthly, by using a pencil or parallel beam of light as a rod, which by reason of the constant law of reflection, enables minute motions to be exaggerated and clearly seen by a large audience.

Fifthly, by means of an arrangement called the aphengescope, whereby opaque objects of a limited size can be projected upon the screen.

The first method, or ordinary projection, includes a very large field for useful work, and, indeed, this alone would render the lantern invaluable as an educational agent. This method of projection takes in all those experiments that can be performed in the front of the condenser, such as tank experiments and objects of a fairly well-defined outline. Mechanical moving slides and such like can all be shown in this one way.

The only drawback to this method of projection is that in all cases where the objects cannot be inverted in front of the condenser they are inverted upon the screen, and sometimes causes confusion to the students. Therefore, whilst illustrating experiments with apparatus whose nature does not allow of inversion, an erecting prism has to be used, which consists of a right angled prism supported in front of the objective of the lantern, as shown in Fig. I., (R) representing the reversing prism. In demonstrating, try and avoid its use as much as possible, as a great amount of time is lost in arranging it for experiments. Their great cost is also a disadvantage against their use generally.

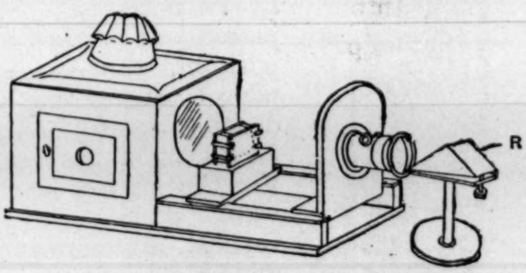

Fig. I.

The second method of shadow projection is much less familiar to demonstrators with the lantern, but it lends itself readily to all on account of several advantages it possesses over the first method. If the light from an electric arc lamp is used, little difficulty should be found; all that is required is to allow the light to pass through as small a hole as is required, but in dealing with limelight where the radiant point is much larger, the image received upon the screen will not have well defined sharp edges unless special precautions are taken. Mr. Wright, who recommends this means of projection in his valuable book upon the subject, advises the removal of the concave paralleliser in his pencil attachment; thus allowing a strong conical pencil of light to be thrown through a very small hole, which will give an illumination whose diverging rays allow of large shadow projections to be easily made.

The one great advantage of this method of projection over the first is that the image upon the screen and size of the objects to be shown are not restricted.

A very simple experiment that can be shown in this manner is described by Professor Newth. The shadow of a stream of hydrogen gas issuing from a bent nozzle is cast upon the screen, and to the audience appears to rise up with the appearance of smoke on account of the difference between the refractive power of hydrogen gas and air.

The third method is by means of the vertical attachment, which consists of an arrangement of lenses and mirrors as shown in Fig. II.

The essential features are the mirror (M), single plano-convex condensing lens (C), objective (J), and mirror (N), which finally projects the object upon the screen. With this arrangement, an object, which by its nature cannot be placed in a vertical position, can easily be placed upon the condensing lens (C) and projected upon the screen. For the greater part of work done with the vertical attachment the mirror (N) will be found all that is required, but when projecting an object with a very decided outline, such as a drawing or design, upon blackened glass, all the lines will appear doubled owing to the reflection from the front and silvered surface of the mirror. To obviate his a right-angled reflecting prism can be used, hereby doing away with the double reflection.

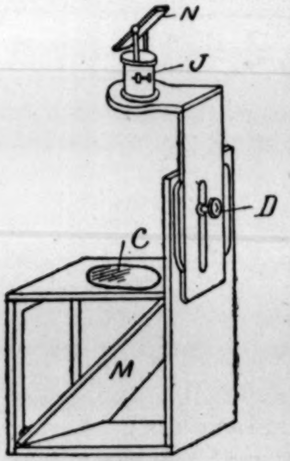

Fig. II.

The fourth means, which consists in using a parallel beam of light, is used mostly where slight motions are required to be rendered more apparent. In using the electric light the rays of light will be found sufficiently parallel if passed simply through a hole in the lantern front the diameter of the beam required; but in using the limelight it will be necessary to use some combination of lens to render the rays parallel. A simple piece of apparatus is now sold by lantern dealers called a paralleliser, and when attached to the lantern front will give the required beam of parallel beam of light. The use of a beam of light in many experiments owes its usefulness to a well-known law of optics, and that is that the angle of reflection is equal to the angle of incidence, which law can be easily verified by an experiment with a piece of apparatus as shown in Fig. III. (T) is the nozzle of the lantern through which enters a parallel beam of light shown by double dotted lines. A mirror (A) is mounted upon two upright supports (B) so as to freely revolve; centrally and at right angles from the face of this mirror is a pointer (P). (S) is a scale made of stout cardboard divided and numbered so as to enable the movement of the beam of light to be read off by means of the pointer (P). By setting the mirror (M) so that the beam of light is reflected back into the nozzle (N) of the lantern the indicator (P) should point at (O) on the curved scale. Having set up our apparatus, correctly turn the mirror so that the pointer is at the division 5, the beam from the nozzle (N) passing through (O) it will then be seen that the reflected beam passes through the division 10 on the scale, and at whatever angle we move the mirror it will be seen that the reflected beam of light, if the reflecting surface is perfectly flat, will always follow the law above mentioned. In this way by means of the beam of light we have at our command a pointer perfectly straight working without weight or friction and of any length we require. It will be observed in using this beam for shewing the motion of a freely suspended bar magnet or

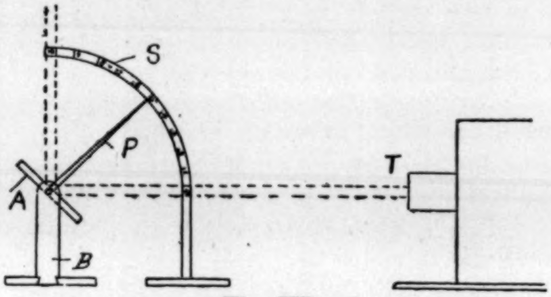

Fig. III.

other similar experiment, that the movement of a reflected beam of light from a mirror affixed to it is double the actual movement of the magnet. Experiments in sound afford us a large scope for the application of the beam of light. Should any difficulty be found in seeing the beam of light distinctly, a puff of smoke in the vicinity of it will render it clearly observable.

The fifth method is the projection of opaque objects by means of the piece of apparatus shown in Fig. IV., and known by the name of aphengescope. It consists of an angular shaped box fitted with an objective directly facing the back portion which is hinged. From either side, and in an angular direction, are placed two lanterns, and the beam of light from both is focussed upon the back portion (O), which receives the object to be shown upon the screen.

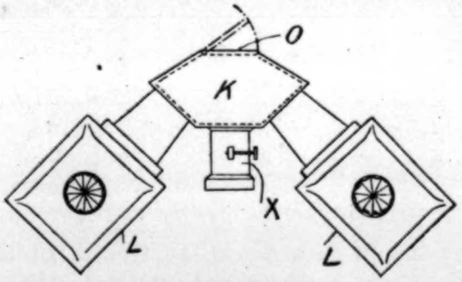

Fig. IV.

Owing to the great amount of light lost in scattered reflection, only small bright pictures can be obtained when using limelight, but with the great amount of light obtained when using electric light, there can be no reason why this method of projection could not be more largely used; a drawing executed upon plain white card or small card models of parts of machinery might easily be projected upon the screen in this way.

The above five headings, under which a large number of experiments can be projected, cover almost the whole of the work that can be done with the lantern. There are others, but they are few. These are at least the chief and most largely employed of the many uses to which the lantern can be put. Anyone carefully reading through, if he has thought out the matter at all, will, when he is seeking for a lantern, look for one that will fully answer all the previous requirements. Do not be afraid of having a lantern too firmly fixed, as there can be nothing worse than when you have carefully arranged your lantern for the projection of a careful experiment than to find that a slight touch you have shifted your lantern and thrown the whole thing out of gear. Upon looking through the various catalogues of makers of lanterns, you will not find much difficulty in finding one to suit these requirements.

A Peep inside Cylinder Valves.

No. I.

The valve on a compressed gas cylinder is a very important fitting; the material of which it is constructed must be non-porous, and it may perhaps be a surprise to many to know that the selection of a material which is absolutely gas-tight at a pressure of 120 atmospheres is no easy task.

In outward appearance the valves in use by the various gas compressers differ, and this also applies to the gas-ways in same. The general principle, however, is the same, and we propose showing the particular manner in which the valves work between the inlet and outlet of each form.

The Brin's Oxygen Company employ a different style at each of their head centres, so that those used to seeing or handling their various cylinders can at once say whether they are of London, Glasgow, Manchester, or Birmingham style. That used at their London house has the appearance of Fig. I., the section of same being shown in Fig. II. The valve body and gland nut (A) are of bronze of dense form. The end (B) is screwed and soldered into the neck of the cylinder. The outlet (C) is provided with a screw and cone for the attachment of fittings. The end of the spindle (D) is coned (and this applies to all spindles) so as to make a perfect seating as shown. In order to prevent any leakage of gas round the screw of the gland valve when it is open, a leather washer surmounted by a metal one is employed; by screwing down the gland nut (A) the pressure on the leather washer forms an effective stoppage of any leak there may happen to be. For oxygen cylinders the thread at (C) is right-handed and for hydrogen cylinders left-handed.

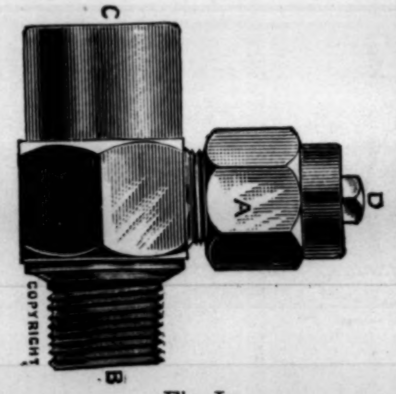

Fig. I.

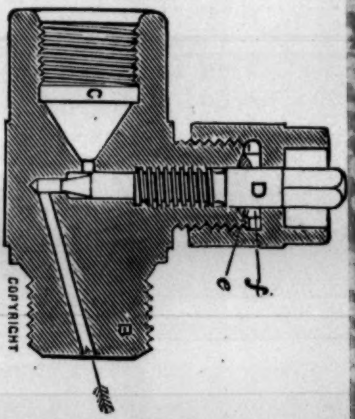

Fig. II.

At the Scotch and Irish headquarters the valve used differs slightly from the foregoing. The gland nut (A) has an inside connection, the leather washer (E) and the metal washer (F) being placed nearer the seating of the valve. The outlet (C) is also of different form, the screw being on the outside. For the better protection of the connecting screw thread, there is a screwed shoulder (G), on which an ordinary three-quarter inch gas cap can be screwed. (Figs. III. and IV).

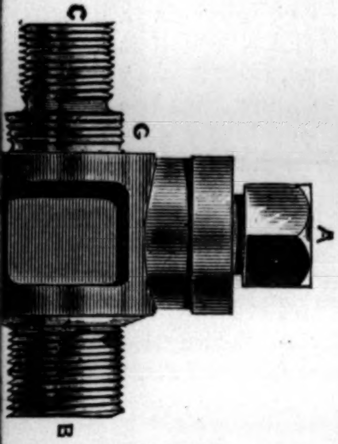

Fig. III.

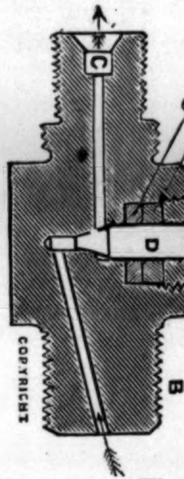

Fig. IV.

Figs. V., VI. represent the Manchester valve. This is in two separate parts, viz., the valve body, and what is known as the shackle (K). The latter, which carries the screw by which the connection is kept tight against the seating (formed as at C for oxygen, and as H for hydrogen) is merely slipped on to the body of the valve. The end (B) is screwed into the cylinder, and the connection stands out at right angles. In this case the gland nut (A) is tightened by means of a forked or divided screw-driver.

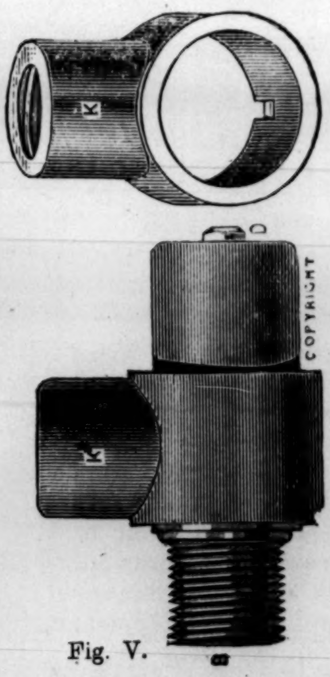

Fig. V.

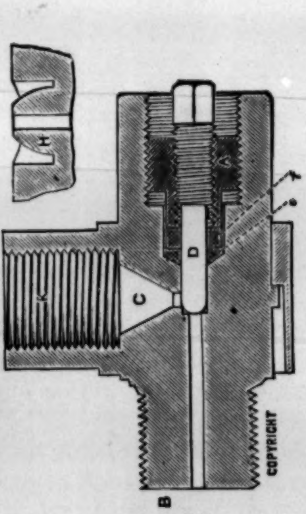

Fig. VI.

The Birmingham valve (Figs. VII., VIII.) is to all intents and purposes similar to one of these previously described, excepting that the gas passages are cut at a different angle, the outlet being similar to that used by the London company, and gland nut like unto that of the Manchester company.

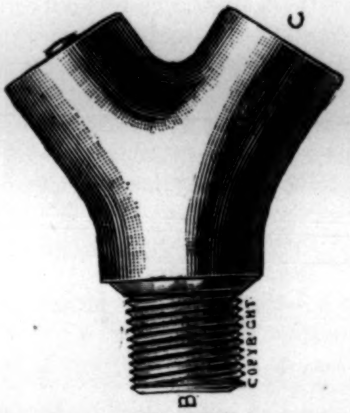

Fig. VII.

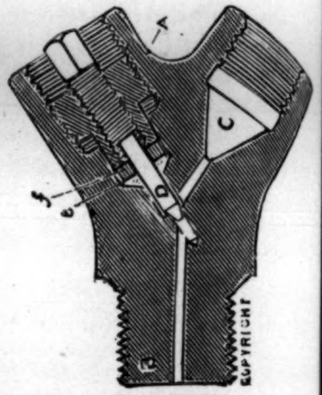

Fig. VIII.

(*To be continued.*)

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The Lanternist's Den.—XVII.

By C. E. Rendle.

TO MAKE A LECTURER'S SINGLE LANTERN.

Some months ago I promised, in reply to enquiries, some hints on the construction of a good single lantern, on the same lines as the bi-unial, which was treated at some length in past numbers of the Optical Magic Lantern Journal, and having now completed a companion instrument to that above mentioned, I purpose giving its dimensions and uses.

By companion instrument—be it noted, the reader is informed, that it will serve as a third lantern, to those who made the bi-unial, as the two together make a triple.

There are some lanternists, however, who never have occasion for such a colossal apparatus as a triple, and there are others who occasionally wish to introduce into their entertainments simple effects which can be done with the bi-unial, while again there are thousands who have no use for either, and who never assume beyond a single lantern, pure and simple.

If those who possess the bi-unial wish further for a triple, their requirements are here met, and they can then use one, two, or three, as occasion demands.

Also, if the possessor of the bi-unial desires a good single lantern, he is accommodated—at the very minimum trouble, and smallest outlay in making an extra body only, for it will be shown that one-half of the brass stages of the bi-unial can in about a minute, without alteration or damage, be transferred to the single body, and *vice versa*.

Again, the opportunity here presents itself to our readers who have not yet tried their hands in this direction, and if so desirous to make a lantern for themselves.

It is not intended to go over ground that has been covered—in other words—to describe the process of cutting a mortise in wood—the chucking of a piece of brass, or the mode and manner of doing this, that, and the other, because such points have already been explained. The information referred to, will be found in Vols. 4 and 5, or if these are not to hand, look up Nos. 53, 54, 55, 56, 58, 60, 65 and 67, keeping them together for reference. By this means it will only be necessary to point to Vol. and page where the instruction may be found.

In most combination lanterns, the single one is placed at the top, but here it takes bottom place, and it will be noticed as we proceed that the inside measurements are a little larger than the double one; therefore the latter, when used in conjunction with the former, drops into it; to be more clear, the bi-unial fits into the single lantern body, instead of the single resting on the bi-unial as is generally the case.

I will give briefly a reason for this. The lantern under discussion varies in some small particulars from the ordinary; for instance, the right hand door is hinged at the top instead of at side, so that when it is open an inch or two, and by the help of side shields, a ray of light is thrown on to a reading stand fitted just beneath it. This is an advantage to the lanternist at times, when circumstances compel him to be his own operator. The back also is furnished with a door hinged at the top, in which the jet aperture is cut. This facilitates the admission of any sized lamp, jet, saturator, or other illuminating agency.

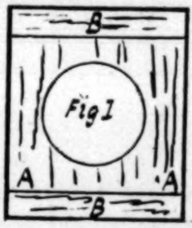
The wood body is made of selected Honduras mahogany.—See page 174, Vol. 4.

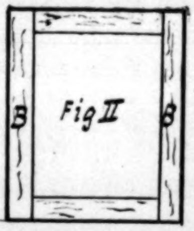
Fig. I. Front, A. to A. 7¾ in. B. B. 9 in. Circle 4½ in. Clamp 1 in. wide mortised and tenoned on.

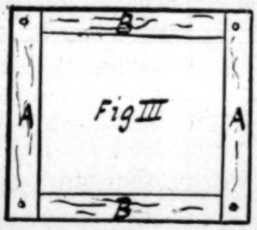
Fig. II. Back, A. to A. 9 in., B. B. 7¾ in. Stiles 1 in. wide. Top rail 1½ in. wide. Bottom rail 1 in. wide. These are tenoned together and rabbeted for door. The widths given are before the rabbets are cut, and when finished will leave the inside measurement of rabbet 6¾ in. × 6$\frac{1}{16}$ in.

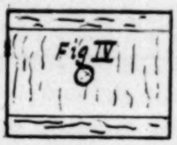
Fig III. The two sides, A. A. 9½ in., B. B. 9 in. Stiles 2½ in. Rails 2¼ in. wide, tenonted together, and rabbeted for doors; inside rabbet 5 in. × 5 in.

Fig IV. Two side doors, 5 in. × 5 in. The rails are 1 in. wide. Diameter of circle 1⅜ in., mortised and tenoned. Left hand door hung at side nearest front, right hand door hinged at top.









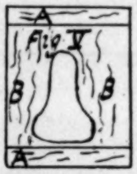


Fig. V. Back door, A. A. 6¾ in. B. B. 6 in. Rails ⅞ in wide. Jet aperture 4¾ in. long, 1¼ in. wide at top, 3¼ in. wide at bottom; put together same as others.

The two sides of the lantern are screwed to the front and back with brass screws. The doors are hung with 1 in. brass hinges.

The base, or plinth, is described on page 200 of Vol. 4, and should be 16 in. long, by 10 in. and secretly tenoned will keep it from casting. Hinged to body with 1½ in. brass hinges.

For fuller particulars of the working and fixing together of the above wood work, the attention of beginners is directed to Vol. 4, page 174, 175, 176, 199 and 200.

(*To be continued*).

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Photography in Colour in the Lantern.

In the Optical Magic Lantern Journal for February, 1891, page 82, we gave an illustration of an apparatus for projecting plain photographs in colour. In this instance four lenses placed close together were used, but owing to these negatives being taken from standpoints differing by an inch or two, the superimposing of the four pictures when placed in the lantern were not mathematically exact.

Mr. R. D. Gray of New York has lately been adopting a more exact method, and has produced some fine results. He describes his mode of procedure as follows:—"I take each negative separately, one after the other, as quickly as possible, which requires, including the time for changing the plates and screens, one and a half minutes. To combine or superimpose the pictures is not a serious matter if suitable apparatus is provided for it. I make ordinary positives on glass, for lantern projections, and secure one of them in a wooden frame which contains spaces for three other slides. To the next one I attach a mechanical device with very delicate screw adjustments by which it can be moved in any direction. The operator at the lantern now moves the picture, as directed by an observer near the screen, until its position is identical with the first, when it is said to be 'in register,' and is sealed in that position. The operation is repeated until all are finished. Each frame is used as an ordinary lantern slide, but in a lantern built with a corresponding number of optical systems, with provisions for inserting coloured glass in the paths of light, each of which should be of a similar colour to that used in taking the negative. If three positives are used, and they are equally transparent in one part of the picture, the red, green and blue lights passing through that part will appear white on the screen. If the blue positive is more opaque in that portion of the picture, the red and green lights will predominate, producing yellow; or if the green positive should be opaque, the red and blue lights in excess make purple. Thus the varying degrees of opacity in the positives, caused by the selective qualities of the photographic plates and colour-screens, however slight, are effective, and the resulting picture shows the delicate tints as well as the brilliant colours of nature."

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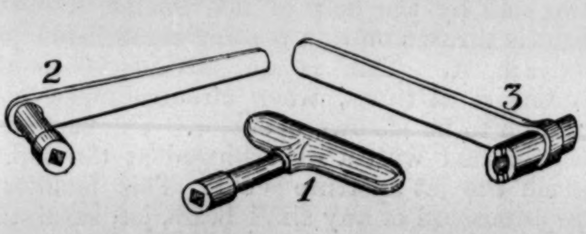
Cylinder Keys and Tinted Glasses.

By Geo. Kilburn.

Once again the lantern season is with us. I mean that part which many call the season, owing, no doubt, to the fact that some only use the lantern during the long winter months, though there are many who are busily engaged with the lantern all the year round. Many lanterns which have not seen daylight for several months will, ere this appears in print, have been brought out of their boxes, and will have had the coat of dust removed, and the dull parts made bright, and any required repairs attended to. Now, if it has not been done before, is the time to give them a thorough overhaul (both lantern and apparatus), and to make sure that everything is in working order. In lanterns, just as in any other work, something sometimes gets wrong, and that nearly always at some critical moment.

Last winter I had to attend a lecture in one of our public halls to operate with the lantern. I had got everything in readiness for lighting up, and was just in the act of turning on the oxygen gas cylinder, when the key broke in two. It was one of the T pattern, and the cross-bar came clean off. I was in a fix for a few moments, as I had not got another key, neither could I obtain any appliances in the place with which I could open the cylinder. However, help came in another direction. I bethought me of a friend who resided close by, and who also was a lanternist. I hastened at once to his house, as it was getting near commencing time. My friend happened to be at home, and he willingly lent me his, so I was able to manipulate the lantern part successfully. After this incident I resolved to be prepared for an emergency of this nature, so I went to a friend who is a brass-worker, and got him to make me one like that given in drawing No. 3, which is practically two keys in one, viz., a bottle key and gland key. The gland end is shown in sketch.

The key No. 1 is similar to that which broke, and I had part of it cut off, the end filed square, and a lever handle firmly rivetted on as shown in No. 2. The cost of No. 3 casting (gun-metal) was one shilling, and for having a handle fitted on another, fourpence. If any reader uses the T pattern let me advise him to have it altered same as No. 2, and after using he will not again desire to use the old pattern.



I will give another hint which may be of service to some lanternist. During the past month (August) I was engaged to go to some fetes and galas to illuminate some "living pictures," and I was required to take some half-dozen tinted glasses to use on the pictures. I did not happen to have glasses of the particular colours asked for, and there was no time to obtain them. Besides, I was uncertain if I wrote to a dealer for them whether I could get the particular colours required. I therefore decided that it would be safest to make some myself. To make them I dissolved Nelson's soft gelatine; then added aniline dye, and coated some glasses with it. Then, having left them on a level board till dry, put on a cover glass to prevent them from getting damaged. These showed far better than some coloured glasses which I obtained from a plumber's shop. By this method, any colour or tint can be obtained, and they can be effectively used when exhibiting lantern slides, if proper tints are selected, as they greatly enhance the beauty of some pictures. Trusting that these hints will be found useful by some brother or sister lanternist.

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My Clerical Lantern Work.

By a Cambridge Reader.

Some five years ago, whilst busy in a large South London parish, I caught the lantern fever. Of course, like others thus smitten, I obtained the price lists of various makers, and eventually became the owner of a really serviceable lantern for the sum of five pounds. Since then I have used it a great deal in practical parochial work, and have shown to hundreds of adults and children and only disappointed them once, when by somebody's blunder I was supplied with an almost empty oxygen cylinder. I thought a few suggestions gathered from my past experience, although not a long one, might be useful to those who, during the coming season, are hoping to begin to use the lantern.

With regard to lantern services, I found that I could not be too careful in the choice of slides that would really illustrate the subject in hand; and here let me express my opinion that the best scripture slides are not those obtained from the great Masters of Art, but those which might be produced from standard works such as those of Dean Farrar or Canon Tristram. I have obtained slides on Saturday morning of such a kind that I have been obliged to run up to London to get a better selection. Again, for the successful singing of hymns at these services, it is most important that well-known tunes should be used; great assistance may be rendered by a choir, if possible the church choir, to lead the singing.

The services I conducted were strictly limited to an hour's duration, and I made the rule that only children accompanied by adults could be admitted. This rule, I am sure, is an important one, and also useful in sometimes obtaining the attendance of adults, who otherwise would not have come except to bring their young, and thus, we hope, themselves deriving some profit.

For the successful working of the lantern at these services, I was greatly indebted to a well-known local lanternist who, when I went to return the oxygen cylinder on Monday mornings, gave me some good wrinkles as to the manipulation of gas and gas cylinders. Beginners, I am certain, can always be sure of getting similar help in this way, and thus save the trouble and expense which is sure to fall on those who are too confident in their own powers and too clever to be taught.

In showing entertainments to children of Day and Sunday schools, I must protest against the melancholy goody-goody tales. I have a lively recollection of sitting in a South London schoolroom listening with difficulty to a lady who for nearly two hours read such a tale (the child died), the pictures were indistinct to me in the middle of the room, and when I got home I found that during the reading of that weary and dreary tale, I had been sitting on a recently varnished form, and brought a good lot of the varnish home with me; but I learned one lesson at that meeting, viz., that I would use my lantern for brightening up the lives of the children, not for giving them morbid tales illustrated by still more morbid pictures, "Taken from death."

Give them some fun and let them have a good laugh now and then; we need not, however, go to the other extreme and show nothing but nonsense. Give them variety, because of their varied natures. Two or three shorter tales I am sure would be far more appreciated than one long one.

The greatest mischief to lantern work is caused by the public exhibitions of unskilled amateurs who have never before shown in public, and who take it for granted they knew all about it, because when youths they possessed a magic lantern, so did I, and because it would not work I stuffed it full of paper and set light to it; it was the lantern work of the servant to take it out of the room on a shovel.

I saw a large number of people disappointed one evening through a young man undertaking to work a bi-unial limelight lantern which he had never seen before, and when it came to lighting up was unable to do so, and so had to obtain an inferior oil lantern. He did not know that the lengthening tubes needed drawing out.

For my own use, I find a single lantern more convenient, as I can myself, by means of straps, carry the whole equipment necessary for a lantern show, excepting the oxygen cylinder, which I get sent direct to the place when wanted, and from whence I return it when done with. The double lantern, because of its weight, would be to me a failure, as cab fares would have to be added to expenses.

The greatest difficulty in going to exhibit is the fixing up of sheet, but this I hope to get over by making for myself a bamboo screen frame. I used to be wicked enough to stuff up gas burners, which could not be turned off, with soap, but now use for them short pieces of india-rubber tubing fitted with corks at one end, the other end being slipped over burners.

I prefer using the limelight to oil because of its greater illuminating power, and because I can tilt my lantern and thus avoid the risk of seeing it descend rather too rapidly from the apex of a pyramid of packing cases and tables, to say nothing of the inconvenience of working a lantern at such a height; another reason, which some will say is a strange one, is that in these days of cil lamp explosions, I feel safer in using even the compressed gas cylinder—of course timid ladies will enquire nervously about the torpedo like thing under the table; such persons it is best to ignore directly, giving them an indirect answer by showing by your easy and hitchless working that there is no real cause for alarm.

With regard to slides, to one and all I would say show good slides, for "there is much rubbish." Use, as far as possible, well-coloured photographic slides.

Before commencing an evening's entertainment, both lecturer and operator should each have on a slip of paper the exact programme to be gone through, the sets of slides and the arrangement of the other items, such as songs and recitations, which are to be interspersed.

To the lecturer I, as an operator, would say do not be too long in your remarks on each slide, as I have noticed many slides which seem to have suffered from their being kept too long in front of a powerful limelight.

To the operator I would say do not be everlastingly fidgetting the light or the focus, or dodging the picture about the screen. He should, as far as possible, endeavour to keep out of the line of vision of those present; this, however, may be secured by an arrangement of the seats beforehand. I am speaking of the use of a short focus lantern. In front of operator's table the seats are better arranged with the passages at the sides of the room, but behind him the passage is better arranged up the middle, so that no one is behind him, whilst he should have sufficient elbow room for convenient working.

To the lecturer, again, I might say the great faults to be guarded against are monotony and inaudibility. Lectures must have some life and energy thrown into them if we are to get people to hear, as well as to see.

In packing up, the amateur operator must try to be content with the thought that he has been doing something for the good of others, and must not be disappointed when not thanked by the chairman. The packing up, however, should not be commenced until the chairman has really ended the meeting by vacating his chair; the light may be turned down, thus allowing the lantern to cool, but to begin packing before the meeting is over is almost as bad a habit as that of the old verger who, whilst the Benediction is being solemnly pronounced from the altar, causes distraction by fussing about with the doors of the church.

In packing up slides, if hired, to put them in right order is an act of thoughtfulness, which I doubt not is appreciated by those to whom they are returned.

Lastly, in alarming cries of "lantern in danger" I do not believe, but am hoping in the future to be able to make it more serviceable in religious and secular education; one thing I am convinced about is, that we should not spare any pains in producing the best definition of the best pictures of the subjects best likely to interest the masses, illustrated and explained by the best lectures, which we ourselves can give or get given.

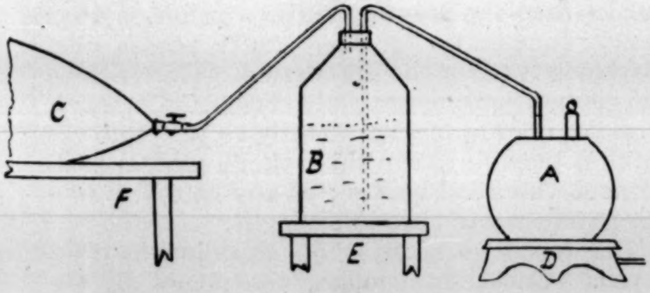
—:o:—

Oxygen Gas.

By Duncan Moore.

There is no doubt that with the exception of electricity the oxy-hydrogen, or limelight, is by far and away the best illuminant for lantern work at present available. Great things are expected from acetylene, but at present this is not a purchaseable commodity in this country, or at any rate it is not exactly in a working form, whatever it may become. The scare produced by the explosion of gas cylinders containing oxygen under great pressure has given the carrying companies a fright, so that many restrictions and difficulties have been put in the way of the consumer getting a prompt supply when railway companies have to be depended on for transit. The scare will probably not last very long, or less strict conditions respecting it will be formulated. Considering the thousands of charged cylinders that for years past have been handled without accidents, the scare seems scarcely warranted; whatever the inconvenience occasioned, it will have the effect of improving the quality of the steel cylinders, and rendering accidents more rare in the future. It seems reasonable to think that danger might be wholly avoided by using less pressure, putting only, say fifteen feet into a twenty feet bottle, but now, whatever is done, the feeling of insecurity will remain for some time to come, and in some cases utterly preclude the use of the oxy-hydrogen light unless the oxygen is prepared at home. The method of doing this I now propose to explain, not at all as a novelty, but to point out a few little items that might be overlooked by an experimentor in his early attempts to make the gas, because there is an undoubted element of danger in improperly going to work. The necessary appliances for the production of oxygen gas are simple and few, consisting of the retort, wash-bottle, with sundry pipes and stop-cocks, these are all that is necessary with the addition of gas bags for storing the products.

Fig. III. Fig. II. Fig. I.



A.—Retort. D.—Gas stove. B.—Wash-bottle. E.—Stool. F.—Table. C.—Gas bag.

In the first place the retort: Sheet and cast iron ones can be readily purchased at comparatively small cost, or the domestic latitudes may be invaded and a cast iron tea kettle requisitioned, or better than that is an iron pot termed a digester for stewing purposes, the lid of which fits accurately with a bayonet joint and provided with a steam valve on the top of the lid. Suppose we acquire one of about a gallon capacity, to adopt it to our purpose the top valve must be replaced by a foot of bent gas pipe made to screw in the lid firmly and air-tight; another small hole, say, half-an-inch in diameter, is also made in the lid, and a piece of gas pipe about three inches long screwed into it, to be closed with a cork, which will act as a safety valve (see Fig. I.) The wash-bottle may consist of a gallon tin can provided with a cork, through which two holes have been bored; a short piece of tube is passed through one of the holes so that it projects half-an-inch or so below the cork, a longer piece reaching nearly to the bottom of the can is passed through the other hole, the outside ends being bent from each other (Fig. II.) The can, half filled with clean water, is ready for use. Five or six feet of india-rubber tubing connects the bent pipe on the top of the retort with the short one in the wash-bottle, another piece connects the longer tube in the wash-bottle with the gas bag. We set to work to generate the gas by first putting in a charge of chlorate of potash four parts, to oxide of manganese one part mixed together; there is no necessity to powder the chlorate. Two pounds and a half of the mixture will well fill an eight feet bag, ample for an evening's entertainment and leave a little over. It is more economising to waste a little and have the bag tightly filled, than to have it scarcely full and flabby. The charge having been introduced, a little ground red lead is rubbed and smeared round the joint of the lid and pot and the lid fixed on. Be careful not to get any of the cement amongst the charge, in fact the greatest care must be exercised that no carbonaceous matter whatever is mixed with it, as the probability is that an explosion will take place.

If the oxygen mixture is purchased ready prepared it is almost sure to be all right. Still it is a good habit to acquire of testing it, especially if it is purchased unmixed. Providing the chlorate looks clean and white it may be considered proper, but the oxide of manganese may be contaminated with various carbonaceous matters, and not show. To make sure it is as it should be, put a little of the mixture in an iron spoon and hold it over a strong gas or spirit flame. Soon as it becomes hot, the correct mixture will merely sparkle, but a dangerous one will produce a number of small explosions; this cracking is a certain sign it is not to be trusted, and another sample had better be procured, minus the disposition to make fireworks.

The gas bag must have its stopcock opened and then be tightly rolled up in order to expel any air, then before unrolling close the stopcock and the bag will be ready for filling, but it must not yet be attached to the wash-bottle.

The retort being filled, and ready with a cork in the safety tube, place it on a gas fire by preference, the heat being thus easily regulated, and gradually warm it up; after a time the gas will begin to come off, this will be known by a bubbling in the wash-bottle. In fact, the sound of the bubbling is a guide to the application of heat; in a few minutes the air contained in the retort and wash-bottle will be driven off. Light a splinter of wood, blow it out and hold the incandescent end to the delivering pipe, then if the oxygen is coming off properly it will burst into flame. Now quickly fit on the rubber pipe to the nozzle of the gas bag and open the tap when the bag will steadily fill. It is best to lay the gas bag on a table, or on something to raise it above the level of the retort and wash-bottle; any moisture will then run back and not block up the delivery pipe.

The connection between the rubber pipe and the metal ones should not be tied or fastened on, but held by their own elasticity, as in case of a pipe becoming chocked they will merely blow off and nothing happen more serious than the loss of a little oxygen.

The most dangerous part to become stopped is the delivery pipe from the retort, which may be avoided by not overcharging, and by the gradual application of the heat; often the evolution of gas ceases entirely before the charge is exhausted; in this case increase the heat, and in a short time the gas will come off as fast as ever.

With ordinary care in these particulars there is absolutely no danger in oxygen making.

I would recommend any one attempting to make oxygen gas that they remain by it, watching the process until completed. A gas bag is soon filled and the little attention regulating the fire, and seeing that the connections and pipes are kept free, is much more conducive to success that setting the apparatus to work and leaving it to take care of itself.

There is another process of oxygen making from chlorinated lime and cobalt, but the foregoing is practically the one used when compressed gas is unobtainable.

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Messrs. Riley Bros. have now eight branches in operation in the United States of America.

*Lantern Slides from Printers' Blocks.

By E. W. Scripture.

In lecturing on experimental psychology, I have found it useful to project on the screen numerous views from the illustrations in my book, "Thinking, Feeling, Doing." At first I prepared the slides, at considerable expense, in the usual way by photography; but it finally occurred to me that it might be possible to print directly on glass from the blocks used in the book.

The electrotypes were obtained and the glass printers in a clock factory were found to do the work. After several experiments the correct method was established.

The metal portion of the cut is mounted on a board of a thickness suited to the particular frame used in the printing.

It is inked with a fine ink (*e.g.*, an 8s. cut or ex-job ink), tempered to the proper consistency with Calcutta boiled oil and japan drier. The precise degree of temper depends on temperature, humidity, and other conditions.

The inking is done by a simple hand roller, of the kind used in ordinary printing.

The block lies face upward on the table and the piece of plain glass is placed at the appropriate distance on a level with it. A composition roller of glue and molassess, made a trifle harder than the regular printer's roller, is then run forward on two guides. As it passes over the block it takes the impression. On reaching the glass, after one complete revolution, it transfers the ink impression directly to it. I do not think it possible to run this roller evenly enough without the steel guides; at any rate, it would not pay to waste time in trying it.

The result is a print on glass just as if on paper. Curiously enough, the prints on the glass are superior to those on paper from the same block. The positives are then finished up as lantern slides in the usual way.

The superiority of the process lies in its great cheapness. Ordinary slides never cost less than 1d. each. Prepared in my way, the first slide costs about 1½d., but the future slides from the same block do not cost over 2½d. each.

The possibilities of the method are extensive. The publisher of an illustrated book, for example, can print off sets of slides for lecturers. Lectures on art, botany, geology, history, etc., can be provided at a small cost.

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* Lecture at Yale University, U.S.A.

Moreover, views not taken from books could be prepared by first turning them into zinc etchings, half-tones, or wood-cuts; and then printing from the blocks. The extensive use of the lantern for purposes of instruction in the common schools is impracticable at present, mainly owing to the cost of the slides. With printing slides, at a trifling cost, the difficulty is removed.

People often complain that new ideas may be useful, but that, when anyone wants to put them into practice, it is difficult to find just the proper method. I have given a description that makes the method possible to any glass printer, or to anyone willing to learn by practice. Where such persons are not available, I am willing to put anyone into communication with the printer of my own slides.

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Backed Lantern Plates.—No. 1.

By S. G. S. Dicker.

Is sufficient care and thought given by the ordinary lantern slide maker to his work? Is it not often the case that a negative is taken from its box or shelf, placed in a printing frame, a lantern plate then taken from its box and placed over the negative, in contact with it, the printing frame back clamped on, and the whole held up to the gas for the prescribed period of 10, 15, 20 or 60 seconds, as directed by the instructions, the plate being then removed and dropped into the developing dish, developed until it looks dense enough and then fixed, washed and dried?

This is the ordinary course, and the result is an ordinary slide—sometimes *very* ordinary. Occasionally slides are toned, but many amateurs do not care to go to that trouble, so they use black tone plates and accept the tone given by development alone for all their slides. However, supposing we admit that by a careful use and discrimination in selection of plates, exposure and development, the tones obtained on the majority of lantern slides are passable, should our care end here, or can our results be further improved? They certainly can, and it is to some of these minor points or details that I wish to draw attention; first disclaiming that anything I am going to say is new (what *is* new in photography?), but they are little details which are apt to be omitted or overlooked, or considered of too little value to be worth attention, whilst their observance may make all the difference between a good and an indifferent slide.

In the first place the negative and lantern plate should be free from dust. Formerly a camel-hair brush was the favourite instrument for dusting purposes, but it was frequently found that one of the strokes of the brush formed a little ridge or streak of dust along the plate which was missed by the next stroke, and the last state of that plate was worse than the first. Nothing can beat the flat plush or velvet brush made after the manner of the well-known flat squeegee—one sweep of the "brush" covering the whole plate effectually. A second detail is always to use a mask with an opening at least just smaller than the lantern slide itself, or showing as much of the picture as is intended to be used. This will obviate fogging of the lantern slide at the edges caused by the light striking sideways through the edge of the glass when a printing frame larger than the transparency plate is employed. This defect is often noticeable in slides covering nearly the whole area of the plate, and the fogging is aggravated by the careless manner in which the frame is often exposed to the illuminant. Instead of being held facing the light, it is often held or turned during the period of exposure very much "edge on," so that the light strikes it in a slanting direction, first on one side and then on the other, lateral fogging then becoming very pronounced. By using a thin black paper mask and exposing the frame properly this will be avoided.

A third detail, and a very important one, is that of *backing* all lantern plates. The evils of halation are generally recognised in connection with gelatino-bromide plates, and backing is resorted to to counteract the effects of local or total over-exposure, but very, very few back their lantern plates. And yet this is very necessary if a good, sparkling slide is desired. No doubt, if exposures were correct, the necessity for backing lantern plates would not be so obvious, but I suppose lantern plate exposures are the most erratic and least considered of any, the general idea being that as long as sufficient exposure is given it does not matter very much how much more is given; the result being that very many plates are over-exposed and a certain amount of halation is caused, and the quality of the slide consequently suffers. This halation is often put down to fog, stale plate, or some other cause than the true one. As an experiment, I would ask the reader who is credulous about the efficiency or desirability of backing lantern plates to try the following experiment. Take a clean piece of glass, say a quarter-plate, and paste upon it some pieces of black paper, say like the following:—

O.M.L.J.

Use this as a negative and place over it a lantern plate which has been backed on one half, either the right or left hand. Now expose it so that the plate shall be fully exposed, or over-exposed, and develop in the ordinary developer. It will be found that the half which was backed will, in spite of the over-exposure, show clear glass in the covered parts, whilst the unbacked half will show a general foggy appearance all over.

Of course it will be said the right way to prevent this is to give the correct exposure, but it is not always easy to determine this, or to give sufficient exposure to one part whilst not over-exposing the other, whereas by backing the plate a much greater latitude in exposure is obtained. Next month I will give some particulars as to making and applying backing, as this paper has already exceeded the limit I had intended.

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Preliminaries.

By a Lantern Lecturer.

One of the many difficulties which beset the amateur lanternist is to be found in the fact that occasionally he is called upon to exercise his skill amidst strange and sometimes unfavourable surroundings. Even the most experienced lecturer is apt to feel a slight amount of trepidation when making his way to lecture in a hall with which he is totally unacquainted. There can be no peace of mind for the conscientious operator until all his apparatus is fixed up, and a preliminary trial assures him that everything is in proper working order. Many an amateur show is marred by insufficient time being allowed for the needful preparations; sometimes up to the hour announced for the lecture, or even long after it, the apparatus is being altered and adjusted, shifted and arranged, until the audience becomes impatient, the lecturer heated and fidgetty, and the operator bothered and cross. Under such circumstances the ultimate success of a lecture is distinctly imperilled, and all because not enough time has been allowed in which to make ready, or else because unforeseen difficulties in arranging matters have been encountered. Unexpected difficulties do, from time to time, confront the travelling lecturer, so that perhaps the following hints may be of use to those amateur lanternists whose engagements during the season may take them into new and unknown localities.

If, on receiving an invitation to lecture, a personal interview with the authorities and an examination of the hall itself is not to be obtained, the lecturer will do well to write for all information concerning the room in which the lecture is to be given. The writer of these lines finds it the most satisfactory plan to submit a printed form containing a series of questions, the majority of which can be answered by a simple "yes" or "no." Among the questions asked are, of course, the length, breadth and height of the room, whether there is a screen fixed in position, or, at all events, belonging to the premises; if lighted by gas or electric light, and if the room will be empty and at the operator's service for a couple of hours previous to the lecture, etc. Armed with these particulars the lecturer will have a good idea of the room in which he will have to work, and will be able to judge what apparatus he must bring, and what he may safely leave at home. Under such circumstances as these the amateur lecturer may feel tolerably easy in his mind if he is on the spot some hour or so before the opening of the doors; but a far preferable plan is to arrive, if possible, before dusk, in order to take a look at the hall, and make, by daylight, such arrangements as may be necessary. Most professional operators adopt this plan, and it is one which amateurs will do well to follow wherever possible.

The buildings in which lectures and lantern entertainments are given are, as often as not, schoolrooms. There is a strong family likeness in such places, and the accessories which serve at one will probably come in useful elsewhere. Let us suppose a lecturer to arrive at a hall or schoolroom during the afternoon. His first business will be to seek out the caretaker, and by a judicious and tactful consideration of the latter's particular weaknesses (for caretakers, though often grumpy, sometimes have a human side), secure him as an ally. If lantern work is of frequent occurrence on the premises, the hanging of the screen will be much simplified, because the last lecturer will probably have left in the walls such nails and hooks as may be necessary for the purpose; so that with the help of the said caretaker the screen is up and in position in a few minutes. It occasionally happens that in some halls, not only are there no fixtures and appliances for facilitating the hanging of the screen, but also that the lecturer is expressly forbidden to drive in a single screw or hook anywhere. It is in such a case as this that the lecturer will learn the benefit of not being behindhand with his preparations. If the roof is an arched one, supported on beams, it is generally possible to get a couple of lines over these beams, by means of which the screen may be hauled up. A ball of string, the end of which is held in the hand, is one of the most convenient methods of getting a hauling line over the beam. If the aim is a poor one, the ball merely falls back again, but if it passes over the beam, in falling it will unwind. By means of this line, thicker cords can be passed over, and such arrangements as the situation may demand be adopted. If the room is without cross-beams or ties, but happens to have a window on each side at a sufficient height, they may be used for securing a cross line, to which the screen can be hoisted. The strain of the rope should not be allowed to fall on the frame of the window itself, but on to a toggle (that is, a strip of wood or thin bar of iron) placed across the window outside, the ends resting on the brick or woodwork surrounding the window. If everything else fails, there still remains the method of raising the screen by constructing a rough framework of wood. The nearest timber or builder's yard will furnish the necessary stuff—quartering, as it is called. It should be pine, about two by three inches in size, and a couple of lengths for each side lashed together will form makeshift uprights, by means of which the screen may be got into position. Lashing the lengths together is preferable to nailing them, since it leaves the wood uninjured when done with.

When the screen is up, a glance from the position which the lantern is to occupy will determine as to whether any gas pendants or brackets intervene between the lens and the screen; if so, they must be turned to one side. This can generally be managed by carefully ascertaining the position and direction of the elbows in the connecting pipe, and turning the pendant up accordingly; but sometimes the joints and sockets are rusted up tight, and refuse to turn. In such a case there is nothing to be done but to get as close to the screen as possible, to use a short focus objective, and to make the best of a bad job.

Part and parcel of the operator's work is to make himself familiar with the position of the valves, etc., which regulate the supply of gas to the hall, so that in case of any emergency he will be able to act promptly. In some lecture-rooms it may be found that it is impossible to turn off the gas without also shutting off the particular jet from which the lantern, when using the blow-through, derives its supply of hydrogen. The easiest method of stopping up such jets as cannot be independently controlled is by coupling them up in pairs with short lengths of rubber piping.

With regard to setting up the lantern there is not much to be said. For sundry reasons, the writer always prefers to set his up on a table, if there happens to be a good strong one in the room. By so doing, the need of tilting is lessened, and the operator and his apparatus is freed from any interference by curious members of the audience. There is just one other matter the lecturer must turn his attention to before he can consider that all is ready, and that is—his means of communicating with the operator. Unquestionably, the best method is by means of an electric tapper. All that is required is a dry battery, an old electric bell with gong removed, and a few yards of suitable covered wire. The writer's signalling apparatus is of the roughest appearance, but quite effective. The battery and the coil and tapper are fastened on to the inside of a small wooden box placed somewhere near the lantern, and the double wire from it is led over gas brackets along window ledges, etc., to the lecturer's desk, and there connected with an ordinary "push." The slight click which the tapper makes, though inaudible to the audience, can be plainly heard by an attentive operator. Such a piece of apparatus costs but a shilling or two and needs no special knowledge of any kind for its construction, is easily and quickly made, and its use, where an operator is new to the lecturer, is almost imperative.

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"Magic or Chameleon Lantern Slides."

By a Lanternist.

The lantern season is fast approaching now that the evenings are getting darker, and the lanternist is no doubt turning out all the miscellaneous odds and ends that make up the outfit. Everything must have a careful scrutiny to see if it wants repairing or cleaning, which should be attended to at once. When that is done, one looks round to see if there is any fresh novelty that can be added that would form an attractive item in an entertainment. The above having occurred to me, I thought as in most entertainments during the interval when the effect slides are being shown, it would be well to introduce something out of the ordinary, and it was by means of my magic or "chameleon" lantern slides that were shown, that I brought about the desired result. Before describing them, I should like to say a few more words. Our audiences nowadays are getting somewhat tired of the ordinary effects that are now produced, unless one has a large and varied assortment, which costs a considerable outlay. Being asked during the last season if I would compete in a competition to make and show something really new, I said I would try, and when it came off there were some most curious effects shown one way and the other, but my "magic" pictures pleased them very much. Taking one of the prepared slides, it was first passed round the audience for them to examine, but after one or two had looked at it, one gentleman remarked that he thought it very probable that I had bound up two plain glasses to show them as a joke, as there was nothing at all discernible. I said if they would, after their inspection, give their attention for two or three minutes, I would show them the result. Putting the slide into the lantern and dissolving off, my plain round disc came upon the screen amidst much laughter. When quietness was again resumed, and asking for their attention, I explained if they would now please observe the disc on the sheet, that the effect had just commenced, when lo! what happened. Gradually and surely was there something coming, and as they waited, the more it came, when after a minute or two was there a nice view of our local pier, with flags flying, the steamboat at the end, the blue sky and the green sea. When this was fairly out it brought down the house as the saying goes, when my learned friend accused me of having shown them one slide and used another, or having slowly used the dissolver in the lantern, but that idea was soon ignored when I explained that I had turned out one of the jets, and a former slide that was shown was still in its place.

I did not then explain how it was done, and to many no doubt reading this, it sounds twaddle, but no, 'tis not so, and I will now explain to you how it was done. Having chosen two of the very finest glasses that I could obtain, I first prepared one, that is by thorough good cleaning, so that there be no dirt or grease on it, I then take a small quantity of benzole or benzene and put into same a small quantity of rubber solution, so that when dissolved it is about the consistency of ordinary collodion; then take the clean glass and pour over a small quantity of this solution to coat it, and pour off at the corner the surplus back into the bottle, and set up to dry where no dust shall come near it. Whilst that is drying take a small bottle, say two drachms, with some bromide of copper in solution in it, and with this draw upon the prepared glass whatever design you wish to appear later on. We will suppose that we have a small outline that would be of a suitable size, and will trace over same with the copper solution in a fine pointed pen; the more careful and delicately this is done the better will be the finished results. To look at in this stage there appears to be nothing on the glass, but we have traced in a house with tree stretching across the sky; this solution should not be made up too thick, or it will show. Now take a small quantity of muriate of cobalt, and carefully paint in with this the trees, grass and foliage, etc., with a fine brush, and let dry. With a solution of acetate of cobalt, paint in the sky and water, if there should be any of the latter. Now clean the other glass, and put over our painted or prepared glass a suitable mask, and bind the whole up in the usual way. When looking at this slide our design and tints that have been laid on are invisible, but when put into the lantern and the heat rays act on it, the picture will gradually appear on the sheet in a most weird and wonderful manner.

* * *

New Apparatus.

"LEVIATHAN" NOVELTIES.

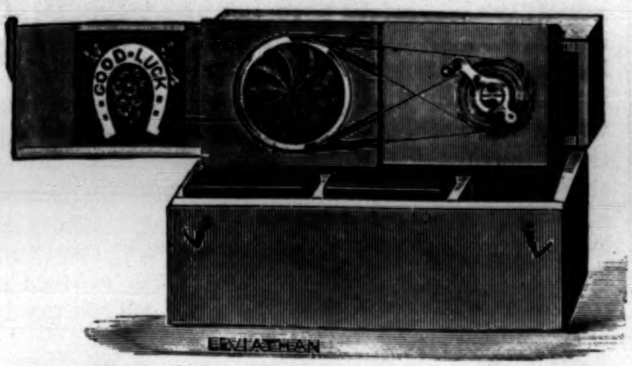
THE wholesale house which uses the words "Leviathan, London," as a trade mark and telegraphic address, have many novelties, some of which are:—

STAR LIMELIGHT JET.—This is provided with a double nozzle, the streams of gas from both of which fall on the same position on the lime. They claim that it gives 600 candle-power. One of the nozzles is provided with a shut-off valve, so that the jet can be used either as single or double as desired.

LIMES.—The idea we suggested in August journal to put up individual limes in hermetically sealed tubes, has been taken up by this firm as well as others, so that in a short time they will be all over the country.

RAY OF LIGHT LAMP.—This is a handy form of lamp of the four-wick class, as the ventilation and draught have been well thought out.

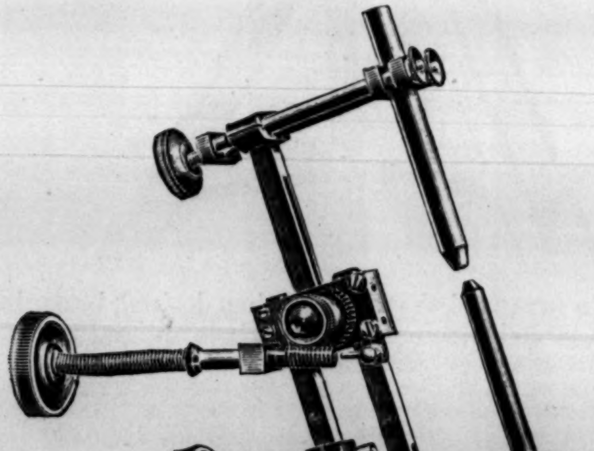
CHROMATIC EFFECT SLIDE SET.



A very pleasing effect is presented in this new set. It consists of an interchangeable quick acting carrier and chromatrope combined. A set consists of the above together with twelve slides of appropriate subjects. The chromatrope is first projected, after which a slide is introduced upon the scene, at the same time giving a most peculiar effect. The slides can be changed with great rapidity, so much so, that the act of changing is not observable.

The cut will give some idea of this novel addition to a lanternist's outfit.

HEPWORTH ARC LAMP.



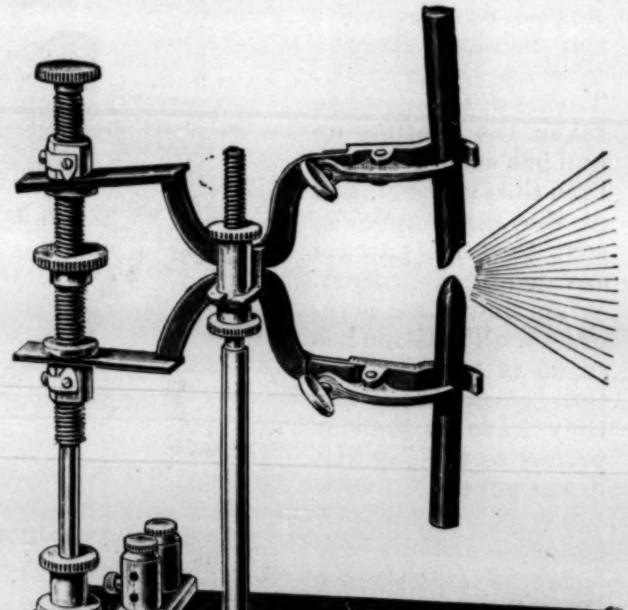
This lamp, which is to be introduced by Messrs. Ross & Co., of Bond Street, has many points of interest. The motions are controlled by three milled heads. The lowest milled head raises or lowers the two carbons for centering, the side motion being obtained from the pivot on which it is attached to stand. The middle head, when in its position as shown, gives a slow movement for bringing the carbons closer together, whilst when the handle is raised, it disengages from the gear wheel, thus permitting of a rapid movement as when renewing carbons. The arc is struck by merely pushing in this handle, thus causing the carbons to come together. The upper handle regulates the distance of the top carbon behind the lower so as to allow the light to be emitted in the best direction.

CLIMAX SATURATOR.

A new saturator has been put upon the market by the inventor, Mr. Houldershaw, of Liversedge. From a picture that we have seen, it presents a good appearance. As soon as we have an opportunity of trying one of those instruments we shall have pleasure in supplying details to our readers.

ARC LAMP.

Barrett's patent arc lamp has been taken up by Messrs. Wrench & Son, who are now placing it upon the market through dealers in lantern apparatus. So simple is the mechanism, that it is amply shown without further description in the sketch herewith.



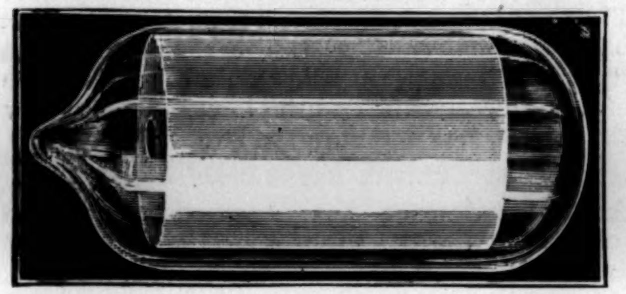
EJECTOR JET.

This jet, issued by the same firm, has been described as a cross between a mixed and blow-through jet, and can be used with hydrogen from the main and oxygen from either cylinder or bag. Each jet has the following trade mark stamped on the tap handles.

TRADE MARK

SEALED LIMES.

In thin close fitting glass tubes, the same firm have decided to supply dealers with limes put up as shown, of both the soft, medium, and hard variety.



LIMES IN HERMETICALLY SEALED TUBES.

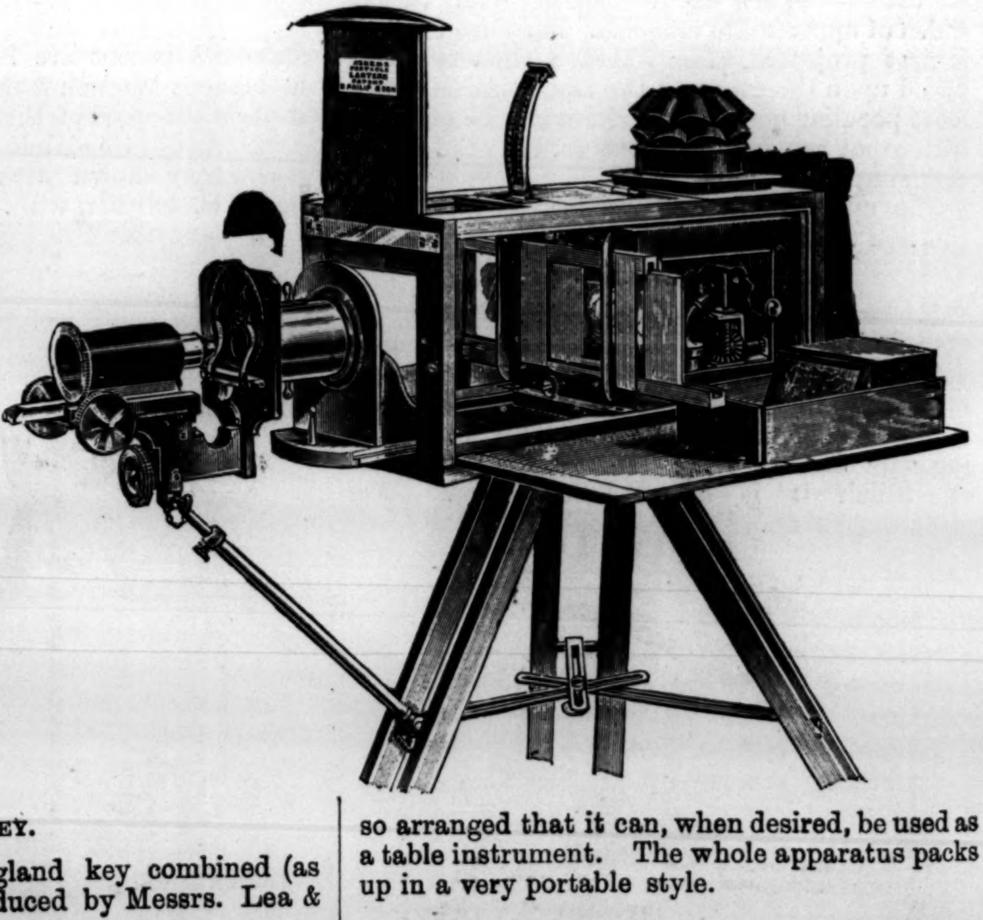
Acting on the suggestion we made in our August number under the heading Suggestions to Dealers, Mr. Trotter of Glasgow has taken the matter up and has sent a sample lime thus encased, and at the same time he says that his patrons are delighted with it. When a new lime is required, all that one has to do is to break the thin glass tube and they have a lime as perfect as the day that it was put up.

KEY.

A new spindle and gland key combined (as shown) has been introduced by Messrs. Lea & Son, of Runcorn. It is made in two sizes: B$\frac{9}{32}$ to suit London size, and C$\frac{5}{16}$ for Midlands size.

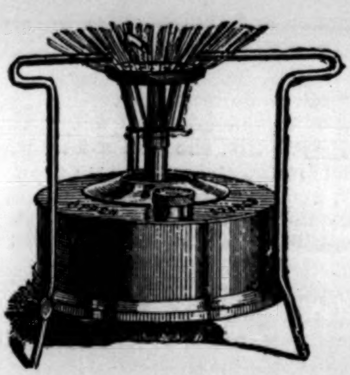
ASKEW'S PORTABLE LIMELIGHT LANTERN.

Messrs. Philip & Son, of Fleet Street, having obtained manufacturing rights of this lantern, have now a number in readiness. The apparatus has lately been improved and is very complete. In a word, it forms its own packing box and table combined. The stand, which is very rigid, having been erected, the lantern which is provided with a turntable is screwed thereon, the sides of the lantern folded down, the front raised up and the lens portion racked out, when the lantern as an ordinary lantern is as soon as the gas has been connected ready as shown. In conjunction with this lantern a microscope is also supplied. This microscope is so arranged that it can, when desired, be used as a table instrument. The whole apparatus packs up in a very portable style.



PETROLIA WICKLESS PARAFFIN STOVE.

In our number for February last year, we called attention to a form of heating lamp, introduced by Messrs. Moeller and Condrup, 78, Fore Street, E.C., which was excellent as a means of warming a dark room, used for photographic purposes during the cold weather, as the flame was exceedingly hot, whilst it gave off no light that would be detrimental during photographic manipulations. In the old form of lamp it was provided with a small pump let into the side, but in the new form, which is here illustrated, the lamp is made self-acting. The reservoir is filled with ordinary paraffin oil, and when wanted for use a small quantity of methylated spirit is poured into a dented cup on top of the reservoir, a match applied, and in a minute or so after the burner has had time to heat, a lever at the bottom of the reservoir is turned to one side according to the amount of flame required, and the lamp will thus go on burning without attention for about a couple of hours. Beside the uses suggested above, this lamp comes in for general domestic use in the cooking, boiling and frying line, all of which are carried out in a perfect manner.



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Editorial Table.

Bible Slides.—As will have been observed from their advertisements in this journal, Messrs. Stevens Brothers of Glasgow make a special feature of Bible slides. Their new catalogue contains an admirable and large list from which to select. In addition to this, they are also introducing sets of slides pertaining to Temperance, and also sets illustrating some of Sir Walter Scott's novels.

G. W. Wilson & Co.—In their new lists, this firm give particulars of a number of new sets of slides pertaining to educational subjects, travel, etc. Among the sets will be found a good one pertaining to Japan and the Japanese. A special list is issued exclusively for the sets pertaining to South Africa.

R. H. Clark.—Each year the catalogue issued by Mr. Clark of Royston, grows larger in size, and this year it has reached nearly 180 pages. Particulars of lanterns costing from a few shillings to several pounds are given; and as for names of sets of slides, their name is legion.

W. C. Hughes.—In a new list of slides for hire, Mr. Hughes calls attention that in order to prevent delay, all hire orders should be sent to his branch at 336, Kingsland Road, in preference to Brewster House, Mortimer Road, Kingsland, as the latter address is reserved for sale and show-room purposes.

Picturesque Worthing.—A fine Souvenir of Worthing, in the shape of a high-class collection of photographic reproductions, has been brought out at the popular price of 1s., by Mr. E. Baruch Blaker, of Worthing. Eighteen fine and interesting views of the town are given, and the whole get up is the perfection of neatness.

Correspondence.

MR. PRINGLES' CHALLENGE *RE* JETS.

To the Editor.

Sir,—Mr. Clay need not fear that I shall consider him bumptious, it is not in my line to blame those who have confidence in their opinions.

I may again point out that my original suggestion was not a competition between any two jets, but a general trial of as many jets as possible, in order that we might see to what extent the claims made for many jets are justified by their performance. But I shall be pleased to meet Mr. Clay at some time and place which I will try to arrange with him by private correspondence; so that he and I at least may come to some conclusion as to our jets.

I agree to his three conditions for our preliminary trial; I always use Brin's gas, I don't care how much gas I use within reason, and the maker's name is of no consequence to me so long as my jets are as good as any others.

I am, your obedient servant,
ANDREW PRINGLE.

Bexley Heath,
September 11th, 1895.

CASH FROM JOHANNESBURG, SOUTH AFRICA WITHOUT ADDRESS.

To the Editor.

Dear Sir,—We have received from some person unknown to us a cutting of our advertisement in your Journal, together with money order, covering value of "Uno Mano Carrier" and postage. This is what we presume he requires, but we have neither his name nor address, so cannot do anything in the matter. As he is evidently a reader of your paper, perhaps if you will be good enough to insert this letter he may see it and give us his name and address. The postmark is Johannesburg, South Africa.

Yours faithfully,
W. H. TOMKINSON.

Liverpool,
September 10th, 1895.

BAGS *V.* CYLINDERS.

To the Editor.

Sir,—Allow me to express my regret at having trodden on "an enthusiastic amateur's" corns, and to say that, although he and his two friends are examples to the contrary, I fear many will agree that there is much room for improvement in most amateur exhibitions. That "bags will not give sufficient pressure to work the best class of mixed jets to their full power" is hardly borne out by facts. Mr. Lewis Wright has investigated this matter of pressure, and recommends for ordinary work a pressure of 9 inches of water, or 6 ounces per square inch, and it is no difficult matter to weight bags so as to give at least this pressure in the jet chamber, provided the passage through the tubing, taps, and dissolver is of sufficient area. Excessive pressure is objectionable, as tending to expel the gases from the orifice in a partially mixed state. I thank "A Reader" for the instance he gives of a retort accident, and fancy the case he refers to is one that was mentioned to me many years ago by a dealer who was trying to sell me a cylinder, though at the time I was told no particulars. It is quite possible that a safety valve opening would have been choked as well as the delivery pipe. I enclose particulars for editorial inspection, and shall be glad if you will say if my case and that referred to by "A Reader" are identical.

Yours truly,
THE WRITER OF THE ARTICLE.

[You are quite correct in your surmise as to the name of the gentleman who was killed.—Ed.]

LANTERN SLIDE EXCHANGE.

To the Editor.

Sir,—I beg to thank you for your note in the September Journal, calling attention to the "Lantern Slide Exchange." Can you spare me space to say, that I shall be glad to have a few more names of amateurs who have surplus slides they are desirous of exchanging for others. There are no fees or restrictions of any kind. The lists, drawn up on suitable forms by the members themselves, contain descriptions of slides "for disposal," or "wanted" on almost every subject; a number of complete lecture sets are also offered in exchange for others. These lists pass from member to member, and I have every reason to believe they have been found very useful.

If any of your subscribers care to join us, I shall be glad if they will communicate with me at once, in order that their lists may be included with the rest, now just starting off on the first round of the season.

I am, Sir,
Yours, etc.,
A. M. HIDDON.

2, Thames Place,
Putney.

:o:

Notes and Queries.

Flowers writes:—"I am engaged in making a series of negatives for reproduction as lantern slides of cut flowers, but unfortunately, sometimes, before I get the negative taken they have somewhat drooped, although I keep them in water. Can you advise me as to any chemical that I could put into the water so as to make them keep fresh a longer time?" *Ans.*—If you put a little salt into the water this will, we think, extend the time to a great extent.

A.M.T.R. asks:—"Why is one maker's objective better than another?" *Ans.*—We presume your question means: In various objectives by different makers why is it that some are better than others. It is a case of curves, knowledge and painstaking, but to enter fully into the matter would require a volume, and perhaps after you had read it you would not be much the wiser.

E.B.—We wrote to ask you if, under the same conditions you mentioned, you could get definition when using the oil lamp with which the lantern was originally fitted, so as to ascertain whether the fault lay with the objective or the new electric lamp, but we received no reply to this.

Beginner writes that he has seen frequent reference in this journal to gland nuts in connection with cylinder valves, and asks what they are for. *Reply.*—The gland nut is used to tighten the packing round the valve spindle so as to prevent leakage of gas.

J. Rawley.—Yes, we have heard of it, but must refuse to express any opinion.

T.D.—Both are equally good.

Caution.—Be careful in your dealings; we never heard of the firm. We think you did right, and you should see that you profit by the experience you have just gone through.

Science.—2, St. Mary's-street, Manchester.

H.C.M.—You will probably find the following satisfactory:—Cut the glass to the size desired, then place in cold water which bring to boiling point, allow to boil a while, then set away to cool, after which the glass can be removed. You should be able to obtain very thin glass in your town, get it about the thickness of thin card such as is used for printing visiting cards.

W. J. Warren.—We thank you for kind invitation (including the refreshment) and regret that we are unable to be present to make the acquaintance of yourself and colleagues.

W. J. Bearne.—All cylinders do not behave in the manner stated. We have a photograph of a cylinder which was in a Glasgow theatre fire, the heat melted the solder, which was sweated round the valve screw connected with the cylinder, and the intense heat created by the fire with oxygen merely fused the end of the cylinder. Why the Bromwich one did not behave in the same way, we cannot say.

S. L. Wilton.—You will pardon our saying you are not a very careful reader of this journal, else you would have found the very article you require described and illustrated on page 125 of our August number.

W. C. Foster.—Having musical talent at hand, you cannot do better than have songs illustrated with slides; such sets as the "Old maids from Lea," or the "Blind beggars" are of an excellent type. Whilst miscellaneous slides are being shown, have soft music on the pianoforte. In every catalogue you will find short tales of a humorous nature, and keep in mind that three or four short pieces are much better than one long piece. Stories of the "Christie's old organ" class, are far too heavy nowa days. Wind up with a few comics and chromatropes for the juveniles.

H. C. Owens (San Francisco)—Your former subscription was sent on to London and your copy was sent from here, but it is now despatched by some of our American agents; but as you say it reaches you regularly, that is the main thing.

Dennis Sweeney.—Yes, after a few trials at home you should manage it. Better remove saturator from lantern and try it in various ways when standing on a table so as to make sure that you thoroughly understand its manegement. If wall is white and screen thin, keep it a little way off, otherwise it does not matter.

T. Maguire.—1. There is no danger so to speak in using blow-through and gas bag, but any apparatus, even a knife, in the hands of one devoid of experience is dangerous. 2. We consider a cylinder safer. 3. For an 8 feet bag 60 to 100 lbs. weight. 4. Not with a blow-through, but probably with a mixed jet. 5. The effect would be that if a light were near the place would be more or less wrecked; anyhow, there would be a scare. 6. Hard are better for all-round work.

Forfex.—1. We think not, but during some experiments with a retort, we tried for and got an explosion. 2. It should be kept away from damp, and if this is done there is not much smell, but the better plan would be to convey it in sealed jars or cans. 3. We should say "yes," provided there is a sufficiency of calcium carbide and water, and the vessel was a weak one with no outlet. 4. We do not know whether the vapour is poisonous, but we know from experience that it is most unpleasant. 5. We tried the Bunsen's style, but it was of no use. So far, in our hands, the smallest Brays has been the best.

W.S.—Yes, above the average.